

[Claims for the Patent]

[Claim 1]

A moving picture reproducing apparatus including,
~~at least:~~

a storage medium ~~which stores where~~ data including
~~at least moving picture sequence data are stored;~~

a reading ~~unitsection~~ which reads ~~out~~ data from
the storage medium;

a demodulation and error-correction ~~unitsection~~
which demodulates and error-corrects the ~~read-out~~ data;

a decoding ~~unitsection~~ which decodes the
demodulated and error-corrected data;

a buffer which stores the decoded data; and

a control ~~unitsection~~ which controls, at least,
the reading ~~unitsection~~, the demodulation and error-
correction ~~unitsection~~ and the decoding ~~unitsection~~,
characterized in that the apparatus further comprises:

presenting means for presenting a plurality of
index images representing contents of a moving picture
sequence stored in the storage medium;

selecting means for selecting a desired index
image from the plurality of index images; and

selection determining means for determining
reproduction of a moving picture sequence represented
by the index image selected by the selecting means,

wherein ~~if~~ a selection operation with the
selecting means ~~remains not being performed~~

~~occasionally not operated~~ for a predetermined period,
~~and then coded data of the moving picture sequence~~
represented by the index image selected by the
selecting means are read out and stored in the buffer.
[Claim 2]

A moving picture reproducing method of presenting
a plurality of index images representing contents of a
moving picture sequence stored in a storage medium and
selecting and reproducing a desired moving picture
sequence from the plurality of index images,
characterized in that

the method includes starting to read out coded
data of the moving picture sequence represented by the
index image start□if a state where any index image is
selected remains ~~occasionally lasts~~ for a predetermined
period, ~~and then coded data of the moving picture~~
~~sequence represented by the index image start to be~~
~~read.~~

[Detailed Description of the Invention]

[0001]

[Field of the Invention]

The present invention relates to a moving picture
reproducing apparatus and a moving picture reproducing
method and, in particular, can be preferably utilized
for a moving picture reproducing apparatus ~~foref~~
selecting a desired moving picture from a plurality of
moving pictures and reproducing it and for a moving

picture reproducing method.

[0002]

[Conventional Art]

Technology related to the conventional moving picture reproducing apparatus is disclosed in Japanese Patent Application Laid-Open No. 7-30838. A prior art disclosed in the publication will be described in detail below. Figure 5 is a block diagram of a conventional moving picture reproducing apparatus. In Figure 5, an image selection circuit 501 is a circuit with which a user selects a desired moving picture to input an instruction for reproduction thereof. An index 502 is a circuit which retains a plurality of sets of starting positions for reproducing a moving picture corresponding to a search key allocated to each moving picture. A magnetic disk apparatus 503 is a slow storage apparatus which retains all moving picture data. A buffer 504 is a rapid storage apparatus which retains a section of moving picture data. A reproduction circuit 505 is a circuit for reproducing a moving picture. A display circuit 506 is a circuit which provides a user with a moving picture.

[0003]

Here, in the case where a magnetic disk apparatus 503 stores two types of moving pictures, that is, a first moving picture to which "sea" is allocated as a search key and a second moving picture to which

"mountain" is allocated as a search key, data of the first moving picture are a0, a1, a2 ... starting from a reproduction starting position #A on the magnetic disk apparatus 503. In addition, data of the second moving picture are b0, b1, b2 ... starting from a reproduction starting position #B on the magnetic disk apparatus 503. In addition, the index 502 manages a corresponding table on an individual moving picture stored in the magnetic disk apparatus 503 to display a relation between a search key for selecting the moving picture and the reproduction starting position.

[0004]

The image selection circuit 501 searches for a moving picture complying with search conditions that a user inputs with the index 502 to provide the reproduction circuit 505 with the obtained reproduction starting position. The buffer 504 retains image data in a desired size starting from a reproduction starting position retained in the index 502 and address information ~~which~~^{to} indicates ~~a~~^a storage position of image data on the magnetic disk apparatus 503 in succession to the image data in the desired size. That is, it retains the a0 and a1 data for the moving picture starting from the reproduction starting position #A and address information indicating the storage position of the a2 data and retains the b0 and b1 data for the moving picture starting from the

reproduction starting position #B and address information indicating the storage position of the b2 data.

[0005]

The reproduction circuit 505 reads out moving picture data from the buffer 504 ~~based on~~ the basis of the reproduction starting position provided by the image selection circuit 501 to reproduce the data. Thus, the conventional moving picture reproducing apparatus causes an index storage means 502 to store a plurality of sets of search keys for searching for image data and reproduction starting positions corresponding to those search keys and causes a rapidly accessible buffer means 504 to store image data in a desired size indicated by parta-section or all of index retained in the index storage means and address information to be reproduced in succession to the image data. Therefore the image selection circuit 501 selects an index and the reproduction circuit 505 causes the display circuit 506 to display a desired image, which is then read from the buffer 504 to start reproduction. Thereby latency time from the reproduction instruction to image display start can be shortened.

[0006]

[Problems to be Solved by the Invention]

As described above, a conventional moving picture

reproducing apparatus is required to prepare in a buffer in advance an image data in a desired size starting from a reproduction starting position indicated by ~~part-section~~ or all index retained by an index means in accordance with information indicated by an index and address information of an image data displayed in succession thereto, giving rise, therefore, to a problem that a large buffer memory is required. In addition, this gives rise to a problem that the cost for apparatuses increases or apparatuses become larger. An object of the present invention is to solve at least one of such problems and the present invention provides a moving picture reproducing apparatus and a moving picture reproducing method which solve the problems.

[0007]

[Means for Solving the Problems]

The present invention adopts a configuration as follows in order to solve the above described problems. That is, an invention of claim 1 is moving picture reproducing apparatus including, ~~at least~~: a storage medium ~~which stores~~ where data including at least moving picture sequence data ~~are stored~~; a reading ~~unit-section~~ which reads out data from the storage medium; a demodulation and error-correction ~~unit-section~~ which demodulates and error-corrects the read data; a decoding ~~unit-section~~ which decodes the demodulated and error-corrected data; a buffer which stores the decoded

data; and a control ~~unit~~section which controls, at least, the reading ~~unit~~section, the demodulation and error-correction ~~unit~~section and the decoding ~~unit~~section, characterized in that the apparatus further comprises presenting means for presenting a plurality of index images representing contents of a moving picture sequence stored in the storage medium; selecting means for selecting a desired index image from the plurality of index images, and selection determining means for determining reproduction of a moving picture sequence represented by the index image selected by the selecting means, wherein if a selection operation with the selecting means remains not being performed ~~is occasionally not operated for a~~ predetermined period, ~~and~~ then coded data of the moving picture sequence represented by the index image selected by the selecting means are read out and stored in the buffer. 7 ~~and an~~ invention of claim 2 is a moving picture reproducing method of presenting a plurality of index images representing contents of a moving picture sequence stored in a storage medium and selecting and reproducing a desired moving picture sequence from the plurality of index images, characterized in that the method further includes starting to read out coded data of the moving picture sequence represented by the index image if a state where any index image is selected remains occasionally

~~data~~ for a predetermined period, and then coded data
of the moving picture sequence represented by the index
~~index starts to be read.~~

[0008]

[Embodiments of the Invention]

An embodiment of the present invention will be described with reference to the drawings. Figure 1 is a block diagram of an embodiment of the present invention. Figure 1 illustrates a disk medium 101 where coded data of a moving picture and audio are recorded, a mechanical ~~unit~~section 102 including a pickup, a demodulation and error-correction ~~unit~~section 103, a decoder 105 of decoding the coded data of a moving picture and audio, a control ~~unit~~section 104 of carrying out all controls and buffer memory 106 of accumulating the coded data and the decoded data. Here, the disk medium 101 can be a medium such as a CD-ROM and a DVD dedicated for reading or can be rewritable and reproducible medium such as a magneto-optical disk and a phase-change disk.

[0009]

In addition, Figure 2 illustrates an example of a screen display (GUI) considered as an user interface for carrying out the above described operations and is structured to arrange a plurality of index windows displaying respective sequences on the windows of the

display apparatus such as a monitor to display and make selection through them. Figure 2 illustrates a display screen 201 of a display apparatus such as a monitor, an index image 202 displaying a certain sequence, a cursor 203 for selecting an index image desired by a user out of a plurality of the index images, operation buttons 204 to move the cursor 203 and the selection determining button 205 for determining the index image selected with the cursor 203 as an image to be reproduced.

[0010]

Here, the buttons such as the operation buttons 204 and the selection determining button 205 can be buttons equipped in the present moving picture reproducing apparatus, can be buttons equipped in a remote control or can be virtual buttons that are displayed on a screen in advance and are operated with a touch panel and the like. In addition, the shape of the cursor 203 is displayed in a shape of a quadrangular frame in Figure 2 or otherwise can be comprehensible to specify a certain index window, which is not intended to limit the shape.

[0011]

With reference to Figure 1 and Figure 2, operations of the moving picture reproducing apparatus of the present invention will be described below. With the operation buttons 204, the cursor 203 is moved to

select an image desired for display out of a plurality of index images 202 displayed on the display screen 201. In the present embodiment, each time the upper, lower, left and right operation buttons 204 are pressed, the cursor 203 moves to an index image 202 in the pressed direction.

[0012]

While that operation for moving the cursor 203 is going on, if the cursor 203 ~~remains in~~ remains staying in a certain position for not less than a constant period, then it is comprehended that a video sequence specified by the index image 202 in the position where the cursor 203 is present can be determined for reproduction selection. The control section 104 starts reading the coded data of that video sequence. That is, the mechanical section 102 is caused to search for a track position where the coded data are stored, to read the recorded data and to demodulate and error-correct the data with the demodulation and error-correction section 103. The buffer 106 of the decoding section 105 is caused to accumulate the coded data.

[0013]

In addition, data are accumulated to reach a value determined in advance in the buffer 106, which then temporarily stops its operation. At that time, no selection is occasionally determined with the selection determining button 205 but the cursor 203 is moved

again. Then, it is comprehended that the data accumulated in the buffer 106 are invalid. If the cursor 203 occasionally stays on another new index image 202 for a constant period, then likewise above, the operation of reading the coded data of the video sequence starts. Such a control will deprive necessity for retaining data corresponding to a plurality of index images 202 in the buffer 106 and the data of one kind of moving picture sequence will be retained.

[0014]

Here, Figure 3 illustrates a period spent to start reading-out of coded data of a video sequence from the disk medium 101. As illustrated in Figure 3, the time spent to start reading out the coded data of the video sequence from the disk medium 101 will be the total period of the pickup movement period (approximately 500 msec), the data reading period (several tens msec) and the decoding period (66 msec). In that case, if the data amount is retained so as to make the period of reproducing the moving picture sequence reproducible with the data amount retained by that buffer 106 longer than the period when the image data to be reproduced subsequently is read out from the disk 101, that is, the period 302 indicated in Figure 3 as described above, moving picture sequences will be reproducible in succession.

[0015]

In addition, in that case, since the reading operation for accumulation to the buffer 106 is already carried out once, the pickup is located in the vicinity of the position where the data of the desired moving picture sequence is recorded. Therefore, the period for the pickup movement will become quite short to save the data amount to be accumulated in the buffer 106.

[0016]

When the selection determining button 205 is depressed in the assumption that the index image 202 selected by the cursor 203 is the desired image, the reproduction operation of the image is carried out. At that point of time, the coded data are already stored in the buffer 106. Therefore it is possible to display an image in latency for a period 303 spent for decoding.

[0017]

Next, the case of image data coded in the MPEG standard being a highly efficient moving picture compressing method will be described as an example with reference to the drawings. For example, with the GOP configuration BBIBBP..., correlation between frames is utilized to carry out compression in the MPEG. Therefore, as illustrated in Figure 4, after a first I picture is decoded, the preceding B picture can be decoded. Thereafter, the B picture will be displayed. Therefore as illustrated in the case of NTSC, since a single frame period is approximately 33 msec, an image

will become displayable in approximately 66 msec after the selection determining button is ~~depressed~~^{pushed}. In addition, in the case where coding is carried out on the ~~entire frame concluded~~-basis in a DVC system, JPEG or the like as a coding system, display can be carried out immediately after finalization of decoding of the frame data. Therefore display can start in approximately 33 msec being a single frame period.

[0018]

The operations as described above carry out reproduction. Thereby utilizing a time lag period from a movement of the cursor to a desired image position to an occurrence of pushing a selection determining button, pickup movement and data reading 302 in Figure 3 is carried out in advance and only the data that can be selected and determined are caused to be accumulated in a buffer. Thereby it is realizable to shorten the period up to the display start with a small buffer capacity.

[Advantages of the Invention]

As described above, a conventional moving picture reproduction apparatus is required to prepare in a buffer in advance an image data in a desired size starting from a reproduction starting position instructed by a section or all index retained by an index means in accordance with information indicated by an index and address information of an image data

displayed in succession thereto and, therefore, a large buffer memory is required. Since only the data of a moving picture for reproduction that may be determined to be selected and determined are read out and accumulated in the buffer, it is possible to realize the moving picture reproducing apparatus and the moving picture reproducing method of the present invention with a buffer which is small in size.

[0020]

Moreover, making the buffer size smaller like that, cost reduction of the apparatus and a size reducing design of the apparatus will become attainable.

[Brief Description of the Drawings]

[Figure 1]

Figure 1 is a block diagram illustrating an entire configuration of the moving picture reproduction apparatus of the present invention.

[Figure 2]

Figure 2 is a diagram illustrating index image display and selection buttons of the moving picture reproduction apparatus of the present invention.

[Figure 3]

Figure 3 is a diagram illustrating a period spent up to image reproduction in the moving picture reproduction of the present invention.

[Figure 4]

Figure 4 is a diagram illustrating the timing of

decoding MPEG coded data.

[Figure 5]

Figure 5 is a block diagram illustrating a configuration of a conventional moving picture reproduction apparatus in its entirety.

[Description of Symbols]

101	data-stored disk	
102	mechanical unit <u>section</u>	
103	demodulation and error-correction	
104	control unit <u>section</u>	
105	decoding unit <u>section</u>	
106	buffer	
201	image display	
202	index image	
203	cursor	
204	cursor movement button	
205	selection determining button	
501	image selection circuit	
502	index	
503	magnetic disk apparatus	
504	buffer	
505	reproduction circuit	
506	display circuit	

Figure 1

103 DEMODULATE AND ERROR-CORRECT
104 CONTROL ~~UNIT~~SECTION
105 DECODE
106 BUFFER
#1 IMAGE
#2 AUDIO

Figure 2

205 DETERMINE
#1 UP
#2 DOWN
#3 RIGHT
#4 LEFT

Figure 3

#1 APPROXIMATELY 50 MSEC
#2 PICKUP MOVEMENT
#3 SEVERAL TENS MSEC
#4 READ DATA
#5 -2 FRAME PERIOD (-66 MSEC)
#6 DECODE
#7 START DISPLAYING

Figure 4

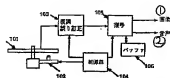
#1 1 PICTURE PERIOD, APPROXIMATELY 33 MSEC
#2 DECODE 1 PICTURE

#3 INSTRUCT REPRODUCTION
#4 DECODE B PICTURE
#5 APPROXIMATELY 66 MSEC
#6 START DISPLAYING
#7 DISPLAY B PICTURE

Figure 5

501 IMAGE SELECTION CIRCUIT
502 INDEX
#1 SEARCH KEY
#2 "SEA"
#3 "MOUNTAIN"
#4 REPRODUCTION STARTING POSITION
504 BUFFER
505 REPRODUCTION CIRCUIT
506 DISPLAY CIRCUIT

Fig. 1
【図1】



(3)

Fig. 4
【図4】

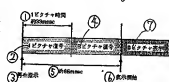


Fig. 2
【図2】

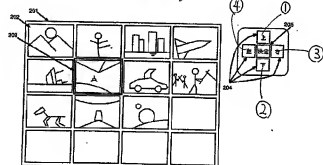
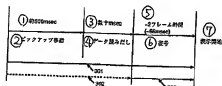


Fig. 3
【図3】



(圖5)

